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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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**CLAIM + DETAILED DESCRIPTION**

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**[Claim(s)]**

[Claim 1] It was obtained with the dry process, An activated carbon fiber is contained 10weight % or more, and a wave height is 5-30mm, Wave pitch is 0.5 to 4 crest per cm, To 0.8-3.0-mm-thick one side or both sides of a corrugated sheet Thermal melting arrival of the planate thermoplastic synthetic fiber sheet is carried out. The adsorption element characterized by becoming.

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention carries out the principal component of the activated carbon fiber, and relates to an adsorption element suitable as a material for gas phase adsorption or liquid phase adsorption.

**[0002]**

[Description of the Prior Art] Although granular active carbon was widely used as adsorption material in a gaseous phase or the liquid phase, since the rate of adsorption was slow, when granular active carbon needed to make thickness of the adsorption layer fairly large and it let the fluid pass to the adsorption layer for this reason, it had the fault that pressure loss was large.

[0003] In order to cancel the above-mentioned fault, the adsorption material using the activated carbon fiber which is fibrous activated carbon is proposed in recent years. Since the rate of adsorption is very quick, the activated carbon fiber can make thickness of an adsorption layer small. However, the bulk density of an activated carbon fiber is fairly smaller than that of granular active carbon. For example, although the bulk density of granular charcoal is about 0.4-0.5g/cc, the needle punch nonwoven fabric of an activated carbon fiber is only about 0.04-

0.05g/cc. For this reason, if the bulk density of an activated carbon fiber is raised in order not to improve adsorption performance greatly and to improve adsorption performance, even if considering the adsorption capacity per fixed volume it uses an activated carbon fiber, pressure loss will go up.

[0004] In order to make pressure loss of an activated carbon fiber small, the honeycomb structured body using the activated carbon fiber paper obtained by the wet paper-making method is proposed by JP,S59-51423,B. While it has the advantage that this honeycomb structured body has small pressure loss, when fabricating the sheet by this paper-making method in the shape of a ripple A crack and crazing are easily got to Yamabe or a trough, and it has the fault that a uniform-shaped thing is hard to be obtained., Furthermore, the binder for paper making generally used tended to blockade the pore of the activated carbon fiber, and had the problem that the function as activated carbon was also easy to be lost.

[0005]

[Problem to be solved by the invention] This invention solves the above-mentioned problem, the function of an activated carbon fiber is not lost by shaping, and adsorption capacity makes it a technical technical problem to offer the small adsorption element of pressure loss greatly.

[0006]

[Means for solving problem] That is, this invention was obtained with the dry process, An activated carbon fiber is contained 10weight % or more, and a wave height is 5-30mm, Wave pitch is 0.5 to 4 crest per cm, To 0.8-3.0-mm-thick one side or both sides of a corrugated sheet Thermal melting arrival of the planate thermoplastic synthetic fiber sheet is carried out. Let the adsorption element characterized by becoming be a summary.

[0007] This invention is explained in detail hereafter.

[0008] The adsorption element of this invention is on one side of the corrugated sheet 1, as drawing 1 showed, To the thing which carried out thermal melting arrival of the planate thermoplastic synthetic fiber sheet 2, or both sides of the corrugated sheet 1 Thermal melting arrival of the planate sheet 2 is carried out. And the corrugated sheet 1 is obtained with a dry process, And it is required to contain the activated carbon fiber 10weight % or more. The activated carbon fiber which is the principal component of a corrugated sheet has a very quick rate of adsorption compared with other activated carbon, using the activated carbon fiber which has such characteristics, for the first time, adsorption capacity is large and, moreover, the small adsorption material of pressure loss can be obtained.

[0009] A specific surface area the activated carbon fiber used above What is 500-2500m<sup>2</sup>/g is desirable, and under by 500m<sup>2</sup>/g, if the adsorption capacity force declines and 2500m<sup>2</sup>/g is exceeded, the increase in the manufacturing cost of an activated carbon fiber will become large from the adsorption capacity force.

[0010] Moreover, a corrugated sheet is 10 weight % about an activated carbon fiber at least, in

order to hold good adsorption performance, Although it is required to contain 20weight % or more preferably and you may form only by an activated carbon fiber, you may make fiber of other type contain for the purpose, such as raising firmness.

[0011] the thickness of a corrugated sheet -- 0.8-3.0mm, desirable -- It is required to be 0.8 to 2.0 mm. In less than 0.8mm, the adsorption capacity force per unit volume of a corrugated sheet declines, and this thickness has a fault, like homogeneity is missing further at the time of manufacture of a corrugated sheet. If thickness exceeds 3.0mm, the moldability of a corrugated sheet will worsen. Moreover, the metsuke of a corrugated sheet is the point of moldability to 40 - 250 g/m<sup>2</sup>. It is desirable.

[0012] When fabricating this sheet with the sheet which what was obtained with the dry process needed to be used for the corrugated sheet, and was obtained by the wet paper-making method in the shape of a ripple It is difficult to get a crack and crazing to Yamabe or a trough easily, and to obtain a uniform-shaped thing., Moreover, in a dry process, there are also few pore blockade operations of an activated carbon fiber like the binder for wet paper making, and the function as activated carbon does not fall.

[0013] As an example of a dry process, filamentation mixing of an activated carbon fiber and the thermal melting arrival type binder fiber is carried out, and there is a method of obtaining a planate sheet by laminating and heat-treating two or more sheets of the curd web mixed and obtained with the further usual carding machine.

[0014] [ manufacture of a corrugated sheet, and junction on a planate sheet ] For example, it is possible to carry out by the usual ripple felt continuation manufacturing installation, size enlargement can be carried out to a size enlargement roll through the planate sheet containing the activated carbon fiber obtained above at a ripple, thermal melting arrival can make the planate sheet of a synthetic fiber one side or both sides of a corrugated sheet, and it can obtain. Moreover, a corrugated sheet and the planate sheet of a synthetic fiber are not joined directly. May make the hot melt type binder fiber which consists of bicomponent fibers of these sea island structure and sheath-core configurations, such as polyethylene, polypropylene, polyester, and polyamide, etc. intervene, may carry out thermal melting arrival, and a superintendent officer makes a binder fiber 10-80g/m<sup>2</sup> of nonwoven fabric state. Using is desirable.

[0015] Especially the wave height (H of drawing 1 ) of a corrugated sheet has the desirable range of 10-20mm 5-30mm. The problem of the thickness of the adsorption layer using the adsorption element of this invention becoming excessive, or the hardness of a Plastic solid falling, although pressure loss becomes small if pressure loss becomes large at less than 5mm and a wave height exceeds 30mm is produced.

[0016] Moreover, especially wave pitch (P of drawing 1 ) has 1.0 to 3.0 desirable crest 0.5 to 4.0 crest per cm. although pressure loss becomes small when wave pitch is less than 0.5

crests per cm -- the fall of adsorption capacity -- it passes and the strength reduction of a direction poses a problem. On the other hand, if it exceeds 4.0 crests, adsorption capacity will become large, but pressure loss goes abruptly up.

[0017] Any, such as acrylic, a cellulose system, and pitch, are sufficient as the kind of activated carbon fiber which constitutes a corrugated sheet. Moreover, although there are synthetic fibers, such as natural fiber, such as cotton, regenerated fiber, and a polyamide fiber, polyester fiber, poly acrylic nitrile fiber, a polyethylene fiber, as other fiber mixed with an activated carbon fiber The polyester system binder fiber of the sheath-core configuration where are polyethylene terephthalate (PET), thermal melting arrival [ which is especially a kind of a synthetic fiber ] type a binder fiber, for example, a heart component, and a sheath component is Copolymerization PET is desirable.

[0018] As a planate thermoplastic synthetic fiber sheet 2 which are other composition members which constitute the adsorption element of this invention The web which mixed thermoplastic synthetic fibers, such as polyester and polyamide, or the web which mixed the thermal melting arrival type binder fiber to the aforementioned synthetic fiber, textiles, knitting, a mesh-like object, etc. can be used.

[0019] As the ridgeline of this element is carried out in this direction, and it laminates to a multilayer or drawing 2 shows, it involves in cylindrical and the adsorption element of this invention is fabricated, passes a fluid in the direction of a bore formed with a wave part and a planate thermoplastic synthetic fiber sheet, and is processed in it.

[0020] Since the corrugated sheet containing an activated carbon fiber is obtained with a dry process and the adsorption element of this invention is carrying out thermal melting arrival of a corrugated sheet and the planate thermoplastic synthetic fiber sheet It is the small adsorption material of pressure loss with possible fully demonstrating the adsorption performance which there is almost no adsorption capacity force fall of the activated carbon fiber by adhesion, and an activated carbon fiber has, and large and adsorption capacity.

[0021] Moreover, since adhesives are not used for adhesion with a corrugated sheet and the planate sheet of a synthetic fiber A water resisting property is good, and is usable to the adsorption treatment of filtration of the solid content in the liquid phase and a gaseous phase, minute impurities, and a detrimental constituent etc., and, specifically, it can be used as an air cleaning filter in extensive fields, such as removal of the solvent smell in removal and gas conditioning, a chemical industry, a printing factory, etc. of a malodorous substance.

[0022]

[Working example] Next, a work example explains this invention concretely. In addition, evaluation in a work example was performed as follows.

(1) In the both-ends side of the direction of a bore of an adsorption element with a moldability 1mx width of 1m, a total of A several for the crash portion of a wave height part and non-

jointing in a trough was  $\frac{A}{B}$  (ed) by a total of B several of a wave height part and a trough, and was evaluated in the following two steps. [ in length ]

O : A is less than 10%. x:A is 10% or more (2). It measured according to pressure loss JIS-B9901.

(3) It is the fragment (5cm x 5cm) of an adsorption element in 1l. of aqueous solutions of 100 mg/l of an adsorption performance azo mono-sulfonic acid type acid dye (FUASUTORETSUDO: molecular weight 400). The aforementioned fragment is taken out and a surface coverage is measured, after supplying and stirring for 3 minutes, The following three-stage estimated.

: O \*\*: 50% or more of a surface coverage, 25% or more of O:surface coverage, less than 50%, less than 25% of a surface coverage [0023] 65 weight % of pitch system activated carbon fibers of work-example 1 specific surface area of 1500m<sup>2</sup>/g and 35 weight % of PET cotton (4d x 64mm) were interwoven, and 60g/m<sup>2</sup> of metsukes and a 0.95-mm-thick activated carbon fiber content sheet were manufactured with the usual curd web and the NIDDORU punch method. It ranks second, it lets the sheet obtained above pass on a size enlargement roll. 20g/m<sup>2</sup> of metsukes whose fusing point it is considered as a corrugated sheet and is 90 degrees C further at one side of a corrugated sheet Polyester system binder fiber web (MERUTORONPES250 by a DAIA bond industrial company) Heat adhesion was carried out at 130 degrees C, and the adsorption element was obtained. The wave height was [ 8.0mm and wave pitch of this adsorption element ] 1 crest / cm. The adsorption element obtained above was involved in cylindrical, as drawing 2 showed, and the spiral object 10cm in diameter and 10cm in length was created. The moldability of the obtained spiral object and the evaluation result of pressure loss and adsorption performance are shown in Table 1.

[0024] 65 weight % of pitch system activated carbon fibers of work-example 2 specific surface area of 1200m<sup>2</sup>/g, 35 weight % of PET cotton (4d x 64mm) is interwoven, and it is a metsuke. The spiral object of the adsorption element was created and evaluated like the work example 1 except having considered it as 120g/m<sup>2</sup> and a 1.5-mm-thick activated carbon fiber content sheet.

[0025] When creating a corrugated sheet with a size enlargement roll using the activated carbon fiber content sheet obtained in the work-example 3 work example 1, the spiral object of the adsorption element was created and evaluated like the work example 1 except being referred to as the wave height of 8.0mm, and wave pitch 2 crest / cm.

[0026] 20g/m<sup>2</sup> of metsukes whose fusing point is 90 degrees C at one side of the corrugated sheet obtained in the work-example 4 work example 1 Polyester system binder fiber web (MERUTORONPES250 by a DAIA bond industrial company) Nonwoven fabric made from polyester (MARIKKUSU 20407WTD by Unitika, Ltd.) In piles The spiral object of the adsorption element was created and evaluated like the work example 1 except carrying out heat adhesion

at 130 degrees C.

[0027] When creating a corrugated sheet with a size enlargement roll using the activated carbon fiber content sheet obtained in the comparative example 1 work example 1, the spiral object of the adsorption element was created and evaluated like the work example 1 except being referred to as the wave height of 8.0mm, and wave pitch 5 crest / cm.

[0028] When creating a corrugated sheet with a size enlargement roll using the activated carbon fiber content sheet obtained in the comparative example 2 work example 1, the spiral object of the adsorption element was created and evaluated like the work example 1 except being referred to as the wave height of 4.0mm, and wave pitch 1 crest / cm.

[0029]

[Table 1]

	压力损失 (mmAq)	成 形 性	吸 着 性 能
実施例 1	14.5	○	○
" 2	17.2	○	◎
" 3	31.0	○	◎
" 4	34.7	○	○
比較例 1	59.0	×	◎
" 2	23.2	×	△

[0030] Moldability is good and pressure loss and adsorption performance were also all excellent in work examples 1-4 so that clearly from Table 1. On the other hand, in comparative examples 1 and 2, moldability was all bad, and although adsorption performance was good in the comparative example 1, pressure loss was large. In the comparative example 2, although pressure loss was small, it was that in which adsorption performance is inferior.

[0031]

[Effect of the Invention] Since the adsorption element of this invention is carrying out thermal melting arrival of the planate thermoplastic synthetic fiber sheet to one side or both sides containing an activated carbon fiber of the corrugated sheet which were obtained with the dry process, it is easy to fabricate and has sufficient hardness also to water. Moreover, since the activated carbon fiber is contained in the corrugated sheet, the content of the activated carbon fiber per unit area increases in form, and it excels also in adsorption performance conjointly with the pore of an activated carbon fiber being hard to be blockaded with adhesives at the time of shaping. Furthermore, since a bore is formed between the wave part of a corrugated sheet, and a planate sheet, pressure loss is small and suitable for applications, such as removal of an air cleaning filter, the removal filter of a solvent smell, and an underwater organic substance.

[Translation done.]